

Watershed Protection Extension, 2000

Proposed Rule Language

Amend § 895.1. Definitions.

Note: The previous amendments to the following nine definitions, which became effective July 1, 2000, shall expire on December 31, 2001. The previous amendments are shown in BOLD text format.

"Bankfull stage" means the stage that occurs when discharge fills the entire channel cross section without significant inundation of the adjacent floodplain, and has a recurrence interval of 1.5 to 2.0 years.

"Beneficial Functions of Riparian Zone" means the specific role of the riparian zone to provide protection for water temperature control, streambed and flow modification by large woody debris, filtration of organic and inorganic material, upslope stability, bank and channel stabilization and vegetative structure diversity for fish and wildlife habitat.

"Channel zone" means that area that includes a watercourse's channel at bankfull stage and a watercourse's floodplain, encompassing the area between the watercourse transition lines.

"Inner Gorge" means a geomorphic feature formed by coalescing scars originating from landsliding and erosional processes caused by active stream erosion. The feature is identified as that area situated immediately adjacent to the stream channel below the first break in slope.

"Saturated soil conditions" means 1) ~~the wetness of the soil within a yarding area such that soil strength is exceeded and displacement from timber operations will occur. It is evidenced by soil moisture conditions that result in:~~ a) reduced traction by equipment as indicated by spinning or churning of wheels or tracks in excess of normal performance, or b) inadequate traction without blading wet soil or, c) soil displacement in amounts that cause visible increase in turbidity of the downstream waters in a receiving Class I or II watercourse or lake. Soils frozen to a depth sufficient to support equipment weight are excluded. 2) soil moisture conditions on roads and landings, in excess of that which occurs from normal road watering or light rainfall that will result in the significant loss of surface material from the road and landings in amounts that cause visible increase in turbidity of the downstream waters in a receiving Class I or II watercourse or lake that site conditions are sufficiently wet that timber operations displace soils in yarding or mechanical site preparation areas or displace road and landing surface materials in amounts sufficient to cause a turbidity increase in drainage facilities that discharge into Class I, II,

1 III, or IV waters, or in downstream Class I, II, III, or IV waters that is
2 visible or would violate applicable water quality requirements.

3 In yarding and site preparation areas, this condition may be evidenced
4 by: a) reduced traction by equipment as indicated by spinning or churning of
5 wheels or tracks in excess of normal performance, b) inadequate traction
6 without blading wet soil, c) soil displacement in amounts that cause visible
7 increase in turbidity of the downstream waters in a receiving Class I, II,
8 III, or IV waters, or d) creation of ruts greater than would be normal
9 following a light rainfall.

10 On logging roads and landing surfaces, this condition may be evidenced
11 by a) reduced traction by equipment as indicated by spinning or churning of
12 wheels or tracks in excess of normal performance, b) inadequate traction
13 without blading wet soil, c) soil displacement in amounts that cause visible
14 increase in turbidity of the downstream waters in receiving Class I, II, III,
15 or IV waters, d) pumping of road surface materials by traffic, or e) creation
16 of ruts greater than would be created by traffic following normal road
17 watering, which transports surface material to a drainage facility that
18 discharges directly into a watercourse.

19 Soils or road and landing surfaces that are hard frozen are excluded
20 from this definition.

21 "Stable operating surface" means that throughout the period of use, the
22 operating surface of a logging road or landing does not either (1) generate
23 waterborne sediment in amounts sufficient to cause a turbidity increase in
24 downstream Class I, II, III, or IV waters that is visible or would violate
25 applicable water quality requirements; or (2) channel water for more than 50
26 feet that is discharged into Class I, II, III, or IV waters.

27 "Watercourse or Lake Transition Line"

28 (a) for a watercourse with an unconfined channel (a channel with a
29 valley to width ratio at bankfull stage of 4 or greater) means that line
30 defined by the landward margin of the most active portion of the channel zone
31 area readily identified in the field by:

32 (1) no soil development, and

33 (2) riparian vegetation dominated by riverine hardwoods and occasional
34 conifers.

35 If field identification is ambiguous, identification of the 20-year
36 flood stage would delimit this portion of the channel zone.

37 (b) for a watercourse with a confined channel means that line closest
38 to the watercourse or lake where riparian vegetation is permanently
39 established that is the outer boundary of a watercourse's 20-year return
40 interval flood event floodplain. This outer boundary corresponds to an
41 elevation equivalent to twice the maximum depth of the adjacent riffle at
42 bankfull stage. The bankfull stage elevation shall be determined by field
43 indicators and may be verified by drainage area/bankfull discharge
44 relationships.

45 (c) for a lake, it is that line closest to the lake where riparian
46 vegetation is permanently established.

1 "Watersheds with threatened or impaired values" means any planning
2 watershed where populations of anadromous salmonids that are listed as
3 threatened, endangered, or candidate under the State or Federal Endangered
4 Species Acts with their implementing regulations, are currently present or
5 can be restored.

6 Note: The following subsection, which was added to the very end of this
7 section (14 CCR § 895.1) following all other rule language, shall be revised
8 as follows:

9 (1) The amendments to 14 CCR § 895.1 adopted on March 15, 2000 and
10 April 4, 2000, which became effective July 1, 2000, shall expire on December
11 31, ~~2000~~ 2001.

12 Note: Authority cited: Sections 4551, 4551.5, 4553, 4561, 4561.5, 4561.6,
13 4562, 4562.5, 4562.7 and 4591.1, Public Resources Code. Reference: Sections
14 4512, 4513, 4526, 4551, 4551.5, 4561, 4561.6, 4562, 4562.5, 4562.7, 4583.2,
15 4591.1, 21001(f), 21080.5, 21083.2 and 21084.1, Public Resources Code; CEQA
16 Guidelines Appendix K (printed following Section 15387 of Title 14 Cal.Code
17 of Regulations), and *Laupheimer v. State* (1988) 200 Cal.App.3d 440; 246
18 Cal.Rptr. 82.

19 **Amend § 898 Feasibility Alternatives**

20 After considering the rules of the Board and any mitigation measures
21 proposed in the plan, the RPF shall indicate whether the operation would have
22 any significant adverse impact on the environment. On TPZ lands, the
23 harvesting per se of trees shall not be presumed to have a significant
24 adverse impact on the environment. If the RPF indicates that significant
25 adverse impacts will occur, the RPF shall explain in the plan why any
alternatives or additional mitigation measures that would significantly
reduce the impact are not feasible.

 Cumulative impacts shall be assessed based upon the methodology
described in Board Technical Rule Addendum Number 2, Forest Practice
Cumulative Impacts Assessment Process and shall be guided by standards of
practicality and reasonableness. The RPF's and plan submitter's duties under
this section shall be limited to closely related past, present and reasonably
foreseeable probable future projects within the same ownership and to matters
of public record. The Director shall supplement the information provided by
the RPF and the plan submitter when necessary to insure that all relevant
information is considered.

1 When assessing cumulative impacts of a proposed project on any portion
2 of a waterbody that is located within or downstream of the proposed timber
3 operation and that is listed as water quality limited under Section 303(d) of
4 the Federal Clean Water Act, the RPF shall assess the degree to which the
5 proposed operations would result in impacts that may combine with existing
6 listed stressors to impair a waterbody's beneficial uses, thereby causing a
7 significant adverse effect on the environment. The plan preparer shall
8 provide feasible mitigation measures to reduce any such impacts from the plan
9 to a level of insignificance, and may provide measures, insofar as feasible,
10 to help attain water quality standards in the listed portion of the
11 waterbody.

12 The Director's evaluation of such impacts and mitigation measures will
13 be done in consultation with the appropriate RWQCB.

14
15 (a) The amendments to 14 CCR § 898 that became effective July 1, 2000
16 shall expire on December 31, ~~2000~~ 2001.

17
18 Note: Authority cited: Sections 4551 and 4553, Public Resources Code.
19 Reference: Sections 4512, 4513, 4551.5, and 4582.75, Public Resources Code;
20 and *Laupheimer v. State* (1988) 200 Cal.App.3d 440; 246 Cal.Rptr. 82.

21 **Amend § 898.2 Special Conditions Requiring Disapproval of Plans**

22 The Director shall disapprove a plan as not conforming to the rules of
23 the Board if any one of the following conditions exist:

24 (a) Boundaries of the area to be harvested are not clearly delineated
25 in the plan.

(b) Public acquisition of the parcel for purposes which would be
impaired by timber harvesting, is legislatively authorized, funded and
imminent.

(c) There is evidence that the information contained in the plan is
incorrect, incomplete or misleading in a material way, or is insufficient to
evaluate significant environmental effects. The sufficiency of the
information provided in a THP to evaluate significant environmental effects
shall be judged in light of what is reasonable and necessary.

(d) Implementation of the plan as proposed would result in either a
"taking" or finding of jeopardy of wildlife species listed as rare,
threatened or endangered by the Fish and Game Commission, the National Marine
Fisheries Service, or Fish and Wildlife Service, or would cause significant,
long-term damage to listed species. The Director is not required to
disapprove a plan which would result in a "taking" if the "taking" is
incidental and is authorized by a wildlife agency acting within its authority
under state or federal endangered species acts.

1 (e) Implementation of the plan would irreparably damage plant species
2 listed as rare or endangered by the Department of Fish and Game and when the
timber owner fails to comply with F&GC 1913.

3 (f) Implementation of the plan as proposed would result in the taking
of an individual Northern Spotted Owl prohibited by the Federal Endangered
Species Act.

4 (g) Implementation of the plan as proposed would not achieve maximum
5 sustained production of high quality timber products as provided for by the
rules of the Board, and by the intent of the Act.

6 **(h) Implementation of the plan as proposed would cause a violation of**
any requirement of an applicable water quality control plan adopted or
approved by the State Water Resources Control Board.

7
8 (i) The amendments to 14 CCR § 898.2 that became effective July 1, 2000
9 shall expire on December 31, ~~2000~~ 2001.

10
11 Note: Authority cited: Sections 4551, 4555 and 4582, Public Resources Code.
12 Reference: Sections 2053, 2080.1, 2090-2097, 2830 and 2835, Fish and Game
Code; Sections 4555, 4582.7 and 4582.75, Public Resources Code; Section
13 51115.1, Government Code; the federal Endangered Species Act of 1973, 16
U.S.C. et seq.; and *Laupheimer v. State* (1988) 200 Cal.App.3d 440; 246
14 Cal.Rptr. 82.

15 **Amend §§ 914.8, 934.8, and 954.8 Tractor Road Watercourse Crossing**

16 Watercourse crossing facilities on tractor roads shall be planned,
constructed, maintained, and removed according to the following standards:

17 (a) The number of crossings shall be kept to a minimum. Existing
crossings **locations** shall be used wherever feasible.

18 (b) A prepared watercourse crossing using a structure such as a bridge,
culvert, or temporary log culvert shall be used to protect the watercourse
from siltation where tractor roads cross a watercourse in which water may be
19 present during the life of the crossing.

20 (c) Crossing facilities on watercourses that support fish shall allow
for unrestricted passage **of all life stages** of fish **that may be present,** and
for unrestricted passage of water. **Such crossing facilities shall be fully**
21 **described in sufficient clarity and detail to allow evaluation by the review**
team and the public, provide direction to the LTO for implementation, and
22 **provide enforceable standards for the inspector.**

23 (d) Watercourse crossing facilities not constructed to permanent
crossing standards on tractor roads shall be removed before the beginning of
the winter period. If a watercourse crossing is to be removed, it shall be
24 removed in accordance with 14 CCR 923.3(d) [943.3(d), 963.3(d)].

25 (e) If the watercourse crossing involves a culvert, the minimum
diameter shall be stated in the THP and the culvert shall be of a sufficient
length to extend beyond the fill material.

1 (f) Consistent with the protection of water quality, exceptions may be
2 provided through the Fish and Game Code and shall be indicated in the plan.

3 (g) The amendments to 14 CCR § 914.8 [934.8, 954.8] that became
4 effective July 1, 2000 shall expire on December 31, ~~2000~~ 2001.

5
6 Note: Authority cited: Sections 4551, 4551.5, and 4553, Public Resources
7 Code. Reference: Sections 4512, 4513, 4527, 4562.5, 4562.7, and 4582, Public
8 Resources Code.

9 **Amend §§ 916, 936, and 956 Intent of Watercourse and Lake Protection.**

10 The purpose of this article is to ~~insure the protection of ensure that~~
11 the beneficial uses ~~that are derived from the physical form, water quality,~~
12 ~~and biological characteristics~~ of watercourses and lakes, native aquatic and
riparian species, and the beneficial functions of riparian zones are
protected from potentially significant adverse site-specific and cumulative
impacts associated with timber operations.

13 It is the intent of the Board to restore, enhance, and maintain the
14 productivity of timberlands while providing equal consideration for the
15 beneficial uses of water. Further, it is the intent of the Board to clarify
16 and assign responsibility, ~~to recognize for recognition of potential and~~
17 ~~existing~~ impacts of timber operations on ~~the beneficial uses of water,~~
18 ~~watercourses and lakes, native aquatic and riparian-associated species, and~~
19 ~~the beneficial functions of riparian zones~~ and to ensure adoption of feasible
20 measures to ~~prevent water pollution related to timber harvesting effectively~~
21 achieve compliance with this article. Further, it is the intent of the Board
22 that the evaluations that are made, and the measures that are taken or
23 prescribed, be documented in a manner that clearly and accurately represents
24 those existing conditions and those measures. "Evaluations made" pertain to
25 the assessment of the conditions of the physical form, water quality, and
biological characteristics of watercourses and lakes, including cumulative
impacts affecting the beneficial uses of water on both the area of planned
logging operations and in the Watershed Assessment Area (WAA). "Measures
taken" pertain to the procedures used or prescribed for the restoration,
enhancement, and maintenance of the beneficial uses of water.

22 All provisions of this article shall be applied in a manner, which
23 complies with the following:

23 (a) During and following timber operations, the beneficial uses of
24 water, native aquatic and riparian-associated species, and the beneficial
25 functions of riparian zones shall be maintained where they are in good
condition, protected where they are threatened, and insofar as feasible,
restored where they are impaired.

25 (b) Protection of the quality and beneficial uses of water during the
planning, review, and conduct of timber operations shall comply with all
applicable legal requirements including those set forth in any applicable

1 water quality control plan adopted or approved by the State Water Resources
2 Control Board. At a minimum, the LTO shall not do either of the following
3 during timber operations:

4 (1) Place, discharge, or dispose of or deposit in such a manner as to
5 permit to pass into the waters of the state, any substances or materials,
6 including, but not limited to, soil, silt, bark, slash, sawdust, or
7 petroleum, in quantities deleterious to fish, wildlife, beneficial functions
8 of riparian zones, or the quality and beneficial uses of water;

9 (2) Remove water, trees or large woody debris from a watercourse or
10 lake, the adjacent riparian area, or the adjacent flood plain in quantities
11 deleterious to fish, wildlife, beneficial functions of riparian zones, or the
12 quality and beneficial uses of water.

13 (c) Protecting and restoring native aquatic and riparian-associated
14 species, the beneficial functions of riparian zones and the quality and
15 beneficial uses of water shall be given equal consideration as a management
16 objective within any prescribed WLPZ and within any ELZ or EEZ designated for
17 watercourse or lake protection.

18 (d) The measures set forth in this Section are meant to enforce the
19 public's historical and legal interest in protection for wildlife, fish, and
20 water quality and are to be used to guide timberland owners in meeting their
21 legal responsibilities to protect public trust resources.

22 (e) The amendments to 14 CCR §§ 916 [936, 956] that became effective
23 July 1, 2000 shall expire on December 31, ~~2000~~ 2001.

24 Note: Authority cited: Sections 4551, 4562.7 and 21000(g), Public Resources
25 Code. Reference: Sections 4512, 4513, 4551.5, 4552, 4562.5, 4562.7,
21001(b), (f), 21002 and 21002.1, Public Resources Code; and Sections 100,
1243, 1243.5, 13001, 13001(f), 13146 and 13147, Water Code.

26 **Amend §§ 916.2, 936.2, and 956.2 Protection of the Beneficial Uses of Water**
27 **and Riparian Functions.**

28 (a) The measures used to protect ~~the beneficial uses of water for~~ each
29 watercourse and lake in a logging area shall be determined by the presence
30 and condition of the following values:

31 (1) The existing and restorable quality and beneficial uses of water as
32 specified by the applicable water quality control plan and as further
33 identified and refined during preparation and review of the plan.

34 (2) The restorable uses of water for fisheries as identified by the
35 ~~Department of Fish and Game~~ DFG or as further identified and refined during
36 preparation and review of the plan.

1 (3) Riparian habitat that provides for tThe biological needs of ~~the~~
2 ~~fish and wildlife native aquatic and riparian-associated species provided by~~
3 ~~the riparian habitat as specified in 14 CCR 916.4(b) [936.4(b), 956.4(b)].~~

4 (4) Sensitive ~~near stream~~ conditions near watercourses and lakes as
5 specified in 14 CCR 916.4(a) [936.4(a), 956.4(a)].
6 These values shall be protected from potentially significant adverse impacts
7 from timber operations and restored to good condition, where needed, through
8 a combination of the rules and plan-specific mitigation.

9 (b) The State's waters are grouped into four classes based on key
10 beneficial uses. These classifications shall be used to determine the
11 appropriate minimum protection measures to be applied ~~to the State's waters~~
12 during the conduct of timber operations. The basis for classification
13 (characteristics and key beneficial uses) are set forth in 14 CCR 916.5
14 [936.5, 956.5], Table 1 and the range of minimum protective measures
15 applicable to each class are contained in ~~Sections 14 CCR 916.3 [936.3,~~
16 ~~956.3], 916.4(a) [936.4, 956.4], and 916.5 [936.5, 956.5].~~

17 (c) When the protective measures contained in 14 CCR 916.5 [936.5,
18 956.5] are not adequate to provide protection to beneficial uses, feasible
19 protective measures shall be developed by the RPF or proposed by the Director
20 under the provisions of 14 CCR 916.6 [936.6, 956.6], Alternative Watercourse
21 and Lake Protection, and incorporated in the TWP plan when approved by the
22 Director.

23 (d) The amendments to 14 CCR § 916.2 [936.2, 956.2] that became
24 effective July 1, 2000 shall expire on December 31, ~~2000~~ 2001.

25 Note: Authority cited: Sections 4551, 4562.7 and 21000(g), Public Resources
Code. Reference: Sections 751, 4512, 4513, 4551.5, 21000(g), 21001(b) and
21002.1, Public Resources Code; Sections 100, 1243, 13050(f) Water Code; and
Sections 1600 and 5650(c), Fish and Game Code.

26 Amend §§ 916.9, 936.9, and 956.9 Protection and Restoration in Watersheds
27 with Threatened or Impaired Values.

28 In addition to all other district Forest Practice Rules, the following
29 requirements shall apply in any planning watershed with threatened or
30 impaired values:

31 (a) GOAL - Every timber operation shall be planned and conducted to
32 prevent deleterious interference with the watershed conditions that primarily
33 limit the values set forth in 14 CCR 916.2 [936.2, 956.2](a) (e.g., sediment
34 load increase where sediment is a primary limiting factor; thermal load
35 increase where water temperature is a primary limiting factor; loss of
36 instream large woody debris or recruitment potential where lack of this value
37 is a primary limiting factor; substantial increase in peak flows or large
38 flood frequency where peak flows or large flood frequency are primary

1 limiting factors). To achieve this goal, every timber operation shall be
2 planned and conducted to meet the following objectives where they affect a
3 primary limiting factor:

4 (1) Comply with the terms of a Total Maximum Daily Load (TMDL) that has
5 been adopted to address factors that may be affected by timber operations if
6 a TMDL has been adopted, or not result in any measurable sediment load
7 increase to a watercourse system or lake.

8 (2) Result in any measurable decrease in the stability of a watercourse
9 channel or of a watercourse or lake bank.

10 (3) Result in any measurable blockage of any aquatic migratory routes
11 for anadromous salmonids or listed species.

12 (4) Result in any measurable stream flow reductions during critical low
13 water periods except as part of an approved water drafting plan pursuant to
14 14 CCR 916.9(r) [936.9(r), 956.9(r)].

15 (5) Consistent with the requirements of 14 CCR § 916.9(i), 14 CCR §
16 936.9(i), or 14 CCR § 956.9(i); protect, maintain, and restore trees
17 (especially conifers), snags, or downed large woody debris that currently, or
18 may in the foreseeable future, provide large woody debris recruitment needed
19 for instream habitat structure and fluvial geomorphic functions.

20 (6) Consistent with the requirements of 14 CCR § 916.9(g), 14 CCR §
21 936.9(g), or 14 CCR § 956.9(g); protect, maintain, and restore the quality
22 and quantity of vegetative canopy needed to: (A) provide shade to the
23 watercourse or lake, (B) minimize daily and seasonal temperature
24 fluctuations, (C) maintain daily and seasonal water temperatures within the
25 preferred range for anadromous salmonids or listed species where they are
present or could be restored, and (D) provide hiding cover and a food base
where needed.

(7) Result in no substantial increases in peak flows or large flood
frequency.

(b) Pre-plan adverse cumulative watershed effects on the populations
and habitat of anadromous salmonids shall be considered. The plan shall
specifically acknowledge or refute that such effects exist. Where
appropriate, the plan shall set forth measures to effectively reduce such
effects.

(c) Any timber operation or silvicultural prescription within 150 feet
of any Class I watercourse or lake transition line or 100 feet of any Class
II watercourse or lake transition line shall have protection, maintenance, or
restoration of the beneficial uses of water or the populations and habitat of
anadromous salmonids or listed aquatic or riparian-associated species as
significant objectives.

Additionally, for evenaged regeneration methods and rehabilitation with
the same effects as a clearcut that are adjacent to a WLPZ, a special
operating zone shall retain understory and mid-canopy conifers and hardwoods.
These trees shall be protected during falling, yarding and site preparation
to the extent feasible. If trees that are retained within this zone are
knocked down during operations, that portion of the trees that is greater
than 6" in diameter shall remain within the zone as Large Woody Debris. The
zone shall be 25 feet above Class I WLPZs with slopes 0-30% and 50 feet above
Class I WLPZs with slopes > 30%.

(d)(1) The plan shall fully describe: (A) the type and location of each
measure needed to fully offset sediment loading, thermal loading, and

1 potential significant adverse watershed effects from the proposed timber
2 operations, and (B) the person(s) responsible for the implementation of each
3 measure, if other than the timber operator.

4 (2) In proposing, reviewing, and approving such measures, preference
5 shall be given to the following: (A) measures that are both onsite (i.e., on
6 or near the plan area) and in-kind (i.e., erosion control measures where
7 sediment is the problem), and (B) sites that are located to maximize the
8 benefits to the impacted portion of a watercourse or lake. Out-of-kind
9 measures (i.e., improving shade where sediment is the problem) shall not be
10 approved as meeting the requirements of this subsection.

11 (e) There shall be no timber operations within the channel zone with
12 the following exceptions:

13 (1) timber harvesting that is directed to improve salmonid habitat
14 through the limited use of the selection or commercial thinning silvicultural
15 methods with review and comment by DFG.

16 (2) timber harvesting necessary for the construction or reconstruction
17 of approved watercourse crossings.

18 (3) timber harvesting necessary for the protection of public health and
19 safety.

20 (4) to allow for full suspension cable yarding when necessary to
21 transport logs through the channel zone.

22 In all instances where trees are proposed to be felled within the
23 channel zone, a base mark shall be placed below the cut line of the harvest
24 trees within the zone. Such marking shall be completed by the RPF that
25 prepared the plan prior to the preharvest inspection.

(f) The minimum WLPZ width for Class I waters shall be 150 feet from
the watercourse or lake transition line.

(g) Within a WLPZ for Class I waters, at least 85 percent overstory
canopy shall be retained within 75 feet of the watercourse or lake transition
line, and at least 65 percent overstory canopy within the remainder of the
WLPZ. The overstory canopy must be composed of at least 25% overstory
conifer canopy post-harvest.

Harvesting of hardwoods shall only occur for the purpose of enabling
conifer regeneration.

(h) For Class I waters, any plan involving timber operations within the
WLPZ shall contain the following information:

1 (1) A clear and enforceable specification of how any disturbance or log
2 or tree cutting and removal within the Class I WLPZ shall be carried out to
3 conform with 14 CCR 916.2 [936.2, 956.2](a) and 916.9 [936.9, 956.9](a).

4 (2) A description of all existing permanent crossings of Class I waters
5 by logging roads and clear specification regarding how these crossings are to
6 be modified, used, and treated to minimize risks, giving special attention to
7 allowing fish to pass both upstream and downstream during all life stages.

8 (3) Clear and enforceable specifications for construction and operation
9 of any new crossing of Class I waters to prevent direct harm, habitat
10 degradation, water velocity increase, hindrance of fish passage, or other
11 potential impairment of beneficial uses of water.

12 (i) Recruitment of large woody debris for aquatic habitat in Class I
13 anadromous fish-bearing or restorable waters shall be ensured by retaining
14 the ten largest dbh conifers (live or dead) per 330 feet of stream channel
15 length that are the most conducive to recruitment to provide for the

1 beneficial functions of riparian zones. The retained conifers shall be
2 selected from within the plan area that lies within 50 feet of the
3 watercourse transition line.

4 The RPF may propose alternatives to substitute smaller diameter trees,
5 trees that are more than 50 feet from the watercourse transition line, or
6 other alternatives on a site specific basis. The RPF must explain and
7 justify in the THP why the proposed alternative is more conducive to current
8 and long-term Large Woody Debris recruitment, shading, bank stability, and
9 the beneficial functions of riparian zones.

10 (j) Where an inner gorge extends beyond a Class I WLPZ and slopes are
11 greater than 55%, a special management zone shall be established where the
12 use of evenaged regeneration methods is prohibited. This zone shall extend
13 upslope to the first major break-in-slope to less than 55% for a distance of
14 100 feet or more, or 300 feet as measured from the watercourse or lake
15 transition line, which ever is less. All operations on slopes exceeding 65%
16 within an inner gorge shall be reviewed by a Certified Engineering Geologist
17 prior to plan approval, regardless of whether they are proposed within a WLPZ
18 or outside of a WLPZ.

19 (k) From October 15 to May 1, the following shall apply: (1) no timber
20 operations shall take place unless the approved plan incorporates a complete
21 winter period operating plan pursuant to 14 CCR 914.7(a) [934.7(a),
22 954.7(a)], (2) unless the winter period operating plan proposes operations
23 during an extended period with low antecedent soil wetness, no tractor roads
24 shall be constructed, reconstructed, or used on slopes that are over 40
25 percent and within 200 feet of a Class I, II, or III watercourse, as measured
26 from the watercourse or lake transition line, and (3) operation of trucks and
27 heavy equipment on roads and landings shall be limited to those with a stable
28 operating surface.

29 (l) Construction or reconstruction of logging roads, tractor roads, or
30 landings shall not take place during the winter period unless the approved
31 plan incorporates a complete winter period operating plan pursuant to 14 CCR
32 914.7(a) [934.7(a), 954.7(a)] that specifically address such road
33 construction. Use of logging roads, tractor roads, or landings shall not take
34 place at any location where saturated soil conditions exist, where a stable
35 logging road or landing operating surface does not exist, or when visibly
36 turbid water from the road, landing, or skid trail surface or inside ditch
37 may reach a watercourse or lake. Grading to obtain a drier running surface
38 more than one time before reincorporation of any resulting berms back into
39 the road surface is prohibited.

40 (m) All tractor roads shall have drainage and/or drainage collection
41 and storage facilities installed as soon as practical following yarding and
42 prior to either (1) the start of any rain which causes overland flow across
43 or along the disturbed surface within a WLPZ or within any ELZ or EEZ
44 designated for watercourse or lake protection, or (2) any day with a National
45 Weather Service forecast of a chance of rain of 30 percent or more, a flash
46 flood warning, or a flash flood watch.

47 (n) Within the WLPZ, and within any ELZ or EEZ designated for
48 watercourse or lake protection, treatments to stabilize soils, minimize soil
49 erosion, and prevent the discharge of sediment into waters in amounts
50 deleterious to aquatic species or the quality and beneficial uses of water,

1 or that threaten to violate applicable water quality requirements, shall be
2 applied in accordance with the following standards:

3 (1) The following requirements shall apply to all such treatments.

4 (A) They shall be described in the plan.

5 (B) For areas disturbed from May 1 through October 15, treatment shall
6 be completed prior to the start of any rain that causes overland flow across
7 or along the disturbed surface.

8 (C) For areas disturbed from October 16 through April 30, treatment
9 shall be completed prior to any day for which a chance of rain of 30 percent
10 or greater is forecast by the National Weather Service or within 10 days,
11 whichever is earlier.

12 (2) The traveled surface of logging roads shall be treated to prevent
13 waterborne transport of sediment and concentration of runoff that results
14 from timber operations.

15 (3) The treatment for other disturbed areas, including: (A) areas
16 exceeding 100 contiguous square feet where timber operations have exposed
17 bare soil, (B) approaches to tractor road watercourse crossings between the
18 drainage facilities closest to the crossing, (C) road cut banks and fills,
19 and (D) any other area of disturbed soil that threatens to discharge sediment
20 into waters in amounts deleterious to the quality and beneficial uses of
21 water, may include, but need not be limited to, mulching, rip-rapping, grass
22 seeding, or chemical soil stabilizers. Where straw, mulch, or slash is used,
23 the minimum coverage shall be 90%, and any treated area that has been subject
24 to reuse or has less than 90% surface cover shall be treated again prior to
25 the end of timber operations. The RPF may propose alternative treatments
that will achieve the same level of erosion control and sediment discharge
prevention.

(4) Where the undisturbed natural ground cover cannot effectively
protect beneficial uses of water from timber operations, the ground shall be
treated by measures including, but not limited to, seeding, mulching, or
replanting, in order to retain and improve its natural ability to filter
sediment, minimize soil erosion, and stabilize banks of watercourses and
lakes.

(o) As part of the plan, the RPF shall identify active erosion sites in
the logging area, assess them to determine which sites pose significant risks
to the beneficial uses of water, assess them to determine whether feasible
remedies exist, and address in the plan feasible remediation for all sites
that pose significant risk to the beneficial uses of water.

(p) The erosion control maintenance period on permanent and seasonal
roads and associated landings that are not abandoned in accordance with 14
CCR 923.8 shall be three years.

(q) Site preparation activities shall be designed to prevent soil
disturbance within, and minimize soil movement into, the channels of
watercourses. Prior to any broadcast burning, burning prescriptions shall be
designed to prevent loss of large woody debris in watercourses, and
vegetation and duff within a WLPZ, or within any ELZ or EEZ designated for
watercourse or lake protection. No ignition is to occur within any WLPZ, or
within any ELZ or EEZ designated for watercourse or lake protection. When
burning prescriptions are proposed, the measures or burning restrictions
which are intended to accomplish this goal shall be stated in the plan and

1 included in any required burning permit. This information shall be provided
2 in addition to the information required under 14 CCR 915.4 [935.4, 955.4].

3 (r) Water drafting for timber operations from within a channel zone of
4 a natural watercourse or from a lake shall conform with the following
5 standards:

6 (1) The RPF shall incorporate into the THP:

7 (A) a description and map of proposed water drafting locations,

8 (B) the watercourse or lake classification, and

9 (C) the general drafting location use parameters (i.e., yearly timing,
10 estimated total volume needed, estimated total uptake rate and filling time,
11 and associated water drafting activities from other THPs).

12 (2) On Class I and Class II streams where the RPF has estimated that:

13 (A) bypass flows are less than 2 cubic feet per second, or

14 (B) pool volume at the water drafting site would be reduced by 10%, or

15 (C) diversion rate exceeds 350 gallons per minute, or

16 (D) diversion rate exceeds 10% of the above surface flow;

17 no water drafting shall occur unless the RPF prepares a water drafting
18 plan to be reviewed by DFG and approved by the Director.

19 The water drafting plan shall include, but not be limited to:

20 1. disclosure of estimated percent streamflow reduction and duration of
21 reduction,

22 2. discussion of the effects of single pumping operations, or multiple
23 pumping operations at the same location,

24 3. proposed alternatives and discussion to prevent adverse effects
25 (e.g. reduction in hose diameter, reduction in total intake at one location,
26 described allowances for recharge time, and alternative water drafting
27 locations),

28 4. conditions for operators to include an operations log kept on the
29 water truck containing the following information: Date, Time, Pump Rate,
30 Filling Time, Screen Cleaned, Screen Conditions, and Bypass flow
31 observations,

32 5. a statement by the RPF for a pre-operations field review with the
33 operator to discuss the conditions in the water drafting plan.

34 (3) Intakes shall be screened in Class I and Class II waters. Screens
35 shall be designed to prevent the entrainment or impingement of all life
36 stages of fish or amphibians. Screen specifications shall be included in the
37 plan.

38 (4) Approaches to drafting locations within a WLPZ shall be surfaced
39 with rock or other suitable material to avoid generation of sediment.

40 (s) No timber operations are allowed in a WLPZ, or within any ELZ or
41 EEZ designated for watercourse or lake protection, under emergency notices or
42 exemption notices except for hauling on existing roads, road maintenance, and
43 operations conducted for public safety.

44 (t) No salvage logging is allowed in a WLPZ without an approved HCP, an
45 SYP, or an approved plan that contains a section that sets forth objectives,
46 goals, and measurable results for streamside salvage operations.

47 (u) Nonstandard practices (i.e., waivers, exceptions, in-lieu
48 practices, and alternative practices) shall comply with the goal set forth in
49 subsection (a) above as well as with the other requirements set forth in the
50 rules.

1 (v) The Director may approve alternatives provided the alternative
2 practice will achieve the goal of this section. The Director shall not
3 accept for inclusion in a plan any alternative practice as described in this
4 section where two or more agencies listed in 4582.6 of the PRC and 14 CCR
5 1037.3 have submitted written comments which lead to the Director's
6 conclusion that the proposed alternative will not meet the goal of this
7 section and the agency(ies) participated in the review of the plan, including
8 an on-the-ground inspection.

9 (w) Other measures that would effectively achieve the goal set forth in
10 14 CCR 916.9(a) [936.9(a), 956.9(a)] may be approved in accordance with 14
11 CCR 916.6 [936.6, 956.6].

12 (x) The provisions of 14 CCR 916.9 [936.9, 956.9] shall not apply to a
13 plan that is subject to an incidental take permit based upon an approved
14 Habitat Conservation Plan that addresses anadromous salmonid protection.

15 (y) This section shall expire on December 31, ~~2000~~ 2001.

16 Note: Authority cited: Sections 4551, 4562.7 and 21000(g), Public Resources
17 Code. Reference: Sections 751, 4512, 4513, 4551.5, 21000(g), 21001(b) and
18 21002.1, Public Resources Code; Sections 100, 1243, 13050(f) Water Code; and
19 Sections 1600 and 5650(c), Fish and Game Code.

20 Amend §§ 916.11, 936.11, and 956.11 Effectiveness and Implementation
21 Monitoring

22 (a) Where timber operations will be conducted within a WLPZ, the
23 Director may require a post-harvest evaluation of the effectiveness of the
24 mitigations and practices designed to protect the watercourse(s) or lake(s)
25 as a condition of plan approval. The Director shall require such an
26 evaluation if the necessity for the evaluation is supported by substantial
27 evidence in the record. This evidence may include, but is not limited to,
28 potential land failures, accelerated rate of road construction or harvesting
29 within a watershed, concentration or intensity of harvesting activity near
30 watercourses, and potential for accelerated windthrow. The design and
31 implementation of the evaluation shall be done in consultation with the
32 Director, the RWQCB or DFG, and THP submitter, and the sufficiency of the
33 information requested by the Director shall be judged in light of
34 reasonableness and practicality. The evaluation may utilize procedures
35 including, but not limited, to:

- 36 (1) Procedures for effectiveness and implementation monitoring,
- 37 (2) Existing landowner monitoring programs, or
- 38 (3) Photographic monitoring

39 (b) This section shall expire on December 31, ~~2000~~ 2001.

1
2 Note: Authority cited: Sections 4551, 4562.7 and 21000(g), Public Resources
3 Code. Reference: Sections 751, 4512, 4513, 4551.5, 21000(g), 21001(b) and
4 21002.1, Public Resources Code; Sections 100, 1243, 13050(f) Water Code; and
5 Sections 1600 and 5650(c), Fish and Game Code.

6 Amend §§ 916.12, 936.12, and 956.12 Section 303(d) Listed Watersheds
7 For any planning watershed in which timber operations could contribute
8 to the pollutants or stressors which have been identified as limiting water
9 quality in a water body listed pursuant to 303(d) Federal Clean Water Act,
10 the following shall apply:

11 (a) The Department shall, in collaboration with the appropriate RWQCB
12 and SWRCB, prioritize watersheds in which the following will be done: 1)
13 conduct or participate in any further assessment or analysis of the watershed
14 that may be needed, 2) participate in the development of Total Maximum Daily
15 Load (TMDL) problem assessment, source assessment, or load allocations
16 related to timber operations, and 3) if existing rules are deemed not to be
17 sufficient, develop recommendations for watershed-specific silvicultural
18 implementation, enforcement and monitoring practices to be applied by the
19 Department.

20 (b) The Department shall prepare a report setting forth the
21 Department's findings and recommendations from the activities identified
22 pursuant to (a) above. The report shall be submitted to the Board and the
23 appropriate RWQCB. The report shall be made available to the public upon
24 request and placed on the Boards' website for a 90-day period.

25 (c) Where the Department has recommended that the adoption of watershed
specific rules is needed, the Board shall consider that recommendation as a
proposal for rulemaking under the Administrative Procedures Act (Section
11340 et. seq. Gov Code) and shall begin that process within 180 days
following receipt of that report.

(d) These watershed specific rules shall be developed in collaboration
with the appropriate RWQCB, the landowner(s) or designee with land in the
planning watershed, and other persons or groups within the watershed, and may
also be incorporated into a TMDL implementation plan.

(e) The watershed specific rules shall remain in effect until the
water body has been removed from the 303(d) list, or that the Board finds,
after consulting with the appropriate RWQCB, that timber operations are no
longer a significant source of the pollutant or stressor that limits water
quality in the listed water body.

(f) This section shall expire on December 31, ~~2000~~ 2001.

1 Note: Authority cited: Sections 4551, 4562.7 and 21000(g), Public Resources
2 Code. Reference: Sections 751, 4512, 4513, 4551.5, 21000(g), 21001(b) and
3 21002.1, Public Resources Code; Sections 100, 1243, 13050(f) Water Code; and
4 Sections 1600 and 5650(c), Fish and Game Code.

5 **Amend §§ 923.3, 943.3, and 963.3 Watercourse Crossings**

6 Watercourse crossing drainage structures on logging roads shall be
7 planned, constructed, **reconstructed**, and maintained or removed, according to
8 the following standards. Exceptions may be provided through application of
9 Fish and Game Code Sections 1601 and 1603 and shall be included in the THP.

10 (a) The location of all new permanent watercourse crossing drainage
11 structures and temporary crossings located within the WLPZ shall be shown on
12 the THP map. If the structure is a culvert intended for permanent use, the
13 minimum diameter of the culvert shall be specified in the plan. Extra
14 culverts beyond those shown in the THP map may be installed as necessary.

15 (b) The number of crossings shall be kept to a feasible minimum.

16 (c) Drainage structures on watercourses that support fish shall allow
17 for unrestricted passage of all life stages of fish that may be present, and
18 shall be fully described in the plan in sufficient clarity and detail to
19 allow evaluation by the review team and the public, provide direction to the
20 LTO for implementation, and provide enforceable standards for the inspector.

21 (d) When watercourse crossings, other drainage structures, and
22 associated fills are removed the following standards shall apply:

23 (1) Fills shall be excavated to form a channel ~~which~~ **that** is as close
24 as feasible to the natural watercourse grade and orientation, and **that** is
25 wider than the natural channel.

(2) The excavated material and any resulting cut bank shall be sloped
back from the channel and stabilized to prevent slumping and to minimize soil
erosion. Where needed, this material shall be stabilized by seeding,
mulching, rock armoring, or other suitable treatment.

(e) All permanent watercourse crossings that are constructed or
reconstructed shall accommodate the estimated 100-year flood flow, including
debris and sediment loads.

(**ef**) Permanent watercourse crossings and associated fills and
approaches shall be constructed or maintained to prevent diversion of stream
overflow down the road and to minimize fill erosion should the drainage
structure become obstructed. The RPF may propose an exception where
explained in the THP and shown on the THP map and justified how the
protection provided by the proposed practice is at least equal to the
protection provided by the standard rule.

(g) Any new permanent culverts installed within class I watercourses
shall allow upstream and downstream passage of fish or listed aquatic species
during any life stage and for the natural movement of bedload to form a
continuous bed through the culvert and shall require an analysis and
specifications demonstrating conformance with the intent of this section and
subsection.

(h) The amendments to 14 CCR §§ 923.3 [943.3, 963.3] that became effective July 1, 2000 shall expire on December 31, ~~2000~~ 2001.

Note: Authority cited: Sections 4551, 4551.5, and 21004, Public Resources Code. Reference: Sections 4512, 4513, 4551, 4551.5, 4562.5 and 4562.7, Public Resources Code; 40 CFR 130.2(q); and California Case Law: *Natural Resources Defense Council, Inc. v. Arcata Natl. Corp.* (1972) 59 Cal. App. #d 959, 131 Cal Rptr. 172.

Amend §§ 923.9 [943.9, 963.9] Roads and Landings in Watersheds with Threatened or Impaired Values.

In addition to all other district Forest Practice Rules, the following requirements shall apply in any planning watershed with threatened or impaired values:

(a) Where logging road or landing construction or reconstruction is proposed, the plan shall state the locations of and specifications for road or landing abandonment or other mitigation measures to minimize the adverse effects of long-term site occupancy of the transportation system within the watershed.

(b) Unless prohibited by existing contracts with the U.S.D.A. Forest Service or other federal agency, new and reconstructed logging roads shall be no wider than a single-lane compatible with the largest type of equipment specified for use on the road, with adequate turnouts provided as required for safety. The maximum width of these roads shall be specified in the plan. These roads shall be outsloped where feasible and drained with water breaks or rolling dips (where the road grade is inclined at 7 percent or less), in conformance with other applicable Forest Practice Rules.

(c) The following shall apply on slopes greater than 50%:

(1) Specific provisions of construction shall be identified and described for all new roads.

(2) Where cutbank stability is not an issue, roads may be constructed as a full-benched cut (no fill). Spoils not utilized in road construction shall be disposed of in stable areas with less than 30 percent slope and outside of any WLPZ, EEZ, or ELZ.

(3) Alternatively, roads may be constructed with balanced cuts and fills if properly engineered, or fills may be removed with the slopes recontoured prior to the winter period.

(d) In addition to the provisions listed under 14 CCR 923.1(e) [943.1(e), 963.1(e)], all permanent or seasonal logging roads with a grade of 15% or greater that extends 500 continuous feet or more shall have specific erosion control measures stated in the plan.

(e) Where situations exist that elevate risks to the values set forth in 14 CCR 916.2(a), [936.2(a), 956.2(a)] (e.g., road networks are remote, the landscape is unstable, water conveyance features historically have a high failure rate, culvert fills are large) drainage structures and erosion control features shall be oversized, low maintenance, or reinforced, or they

1 shall be removed before the completion of the timber operation. The method
2 of analysis and the design for crossing protection shall be included in the
3 plan.

4 (f) The provisions of 14 CCR 923.9 [943.9, 963.9] shall not apply to a
5 plan that is subject to an incidental take permit based upon an approved
6 Habitat Conservation Plan that addresses anadromous salmonid protection.

7
8
9
10 (g) This section shall expire on December 31, ~~2000~~ 2001.

11 Note: Authority cited: Sections 4551, 4551.5, 4553, 4562.7 and 21000(g),
12 Public Resources Code. Reference: Sections 751, 4512, 4513, 4551, 4551.5,
13 4562.5, 4562.7, 21000(g), 21001(b) and 21002.1, Public Resources Code;
14 Sections 100, 1243, 13050(f) Water Code; Sections 1600 and 5650(c), Fish and
15 Game Code; and *Natural Resources Defense Council, Inc. v. Arcata Natl. Corp.*
16 (1976) 59 Cal.App. 3d 959, 131 Cal.Rptr. 172.

17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227
228
229
230
231
232
233
234
235
236
237
238
239
240
241
242
243
244
245
246
247
248
249
250
251
252
253
254
255
256
257
258
259
260
261
262
263
264
265
266
267
268
269
270
271
272
273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288
289
290
291
292
293
294
295
296
297
298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340
341
342
343
344
345
346
347
348
349
350
351
352
353
354
355
356
357
358
359
360
361
362
363
364
365
366
367
368
369
370
371
372
373
374
375
376
377
378
379
380
381
382
383
384
385
386
387
388
389
390
391
392
393
394
395
396
397
398
399
400
401
402
403
404
405
406
407
408
409
410
411
412
413
414
415
416
417
418
419
420
421
422
423
424
425
426
427
428
429
430
431
432
433
434
435
436
437
438
439
440
441
442
443
444
445
446
447
448
449
450
451
452
453
454
455
456
457
458
459
460
461
462
463
464
465
466
467
468
469
470
471
472
473
474
475
476
477
478
479
480
481
482
483
484
485
486
487
488
489
490
491
492
493
494
495
496
497
498
499
500
501
502
503
504
505
506
507
508
509
510
511
512
513
514
515
516
517
518
519
520
521
522
523
524
525
526
527
528
529
530
531
532
533
534
535
536
537
538
539
540
541
542
543
544
545
546
547
548
549
550
551
552
553
554
555
556
557
558
559
560
561
562
563
564
565
566
567
568
569
570
571
572
573
574
575
576
577
578
579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
595
596
597
598
599
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
631
632
633
634
635
636
637
638
639
640
641
642
643
644
645
646
647
648
649
650
651
652
653
654
655
656
657
658
659
660
661
662
663
664
665
666
667
668
669
670
671
672
673
674
675
676
677
678
679
680
681
682
683
684
685
686
687
688
689
690
691
692
693
694
695
696
697
698
699
700
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726
727
728
729
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
747
748
749
750
751
752
753
754
755
756
757
758
759
760
761
762
763
764
765
766
767
768
769
770
771
772
773
774
775
776
777
778
779
780
781
782
783
784
785
786
787
788
789
790
791
792
793
794
795
796
797
798
799
800
801
802
803
804
805
806
807
808
809
810
811
812
813
814
815
816
817
818
819
820
821
822
823
824
825
826
827
828
829
830
831
832
833
834
835
836
837
838
839
840
841
842
843
844
845
846
847
848
849
850
851
852
853
854
855
856
857
858
859
860
861
862
863
864
865
866
867
868
869
870
871
872
873
874
875
876
877
878
879
880
881
882
883
884
885
886
887
888
889
890
891
892
893
894
895
896
897
898
899
900
901
902
903
904
905
906
907
908
909
910
911
912
913
914
915
916
917
918
919
920
921
922
923
924
925
926
927
928
929
930
931
932
933
934
935
936
937
938
939
940
941
942
943
944
945
946
947
948
949
950
951
952
953
954
955
956
957
958
959
960
961
962
963
964
965
966
967
968
969
970
971
972
973
974
975
976
977
978
979
980
981
982
983
984
985
986
987
988
989
990
991
992
993
994
995
996
997
998
999
1000
1001
1002
1003
1004
1005
1006
1007
1008
1009
1010
1011
1012
1013
1014
1015
1016
1017
1018
1019
1020
1021
1022
1023
1024
1025
1026
1027
1028
1029
1030
1031
1032
1033
1034
1035
1036
1037
1038
1039
1040
1041
1042
1043
1044
1045
1046
1047
1048
1049
1050
1051
1052
1053
1054
1055
1056
1057
1058
1059
1060
1061
1062
1063
1064
1065
1066
1067
1068
1069
1070
1071
1072
1073
1074
1075
1076
1077
1078
1079
1080
1081
1082
1083
1084
1085
1086
1087
1088
1089
1090
1091
1092
1093
1094
1095
1096
1097
1098
1099
1100
1101
1102
1103
1104
1105
1106
1107
1108
1109
1110
1111
1112
1113
1114
1115
1116
1117
1118
1119
1120
1121
1122
1123
1124
1125
1126
1127
1128
1129
1130
1131
1132
1133
1134
1135
1136
1137
1138
1139
1140
1141
1142
1143
1144
1145
1146
1147
1148
1149
1150
1151
1152
1153
1154
1155
1156
1157
1158
1159
1160
1161
1162
1163
1164
1165
1166
1167
1168
1169
1170
1171
1172
1173
1174
1175
1176
1177
1178
1179
1180
1181
1182
1183
1184
1185
1186
1187
1188
1189
1190
1191
1192
1193
1194
1195
1196
1197
1198
1199
1200
1201
1202
1203
1204
1205
1206
1207
1208
1209
1210
1211
1212
1213
1214
1215
1216
1217
1218
1219
1220
1221
1222
1223
1224
1225
1226
1227
1228
1229
1230
1231
1232
1233
1234
1235
1236
1237
1238
1239
1240
1241
1242
1243
1244
1245
1246
1247
1248
1249
1250
1251
1252
1253
1254
1255
1256
1257
1258
1259
1260
1261
1262
1263
1264
1265
1266
1267
1268
1269
1270
1271
1272
1273
1274
1275
1276
1277
1278
1279
1280
1281
1282
1283
1284
1285
1286
1287
1288
1289
1290
1291
1292
1293
1294
1295
1296
1297
1298
1299
1300
1301
1302
1303
1304
1305
1306
1307
1308
1309
1310
1311
1312
1313
1314
1315
1316
1317
1318
1319
1320
1321
1322
1323
1324
1325
1326
1327
1328
1329
1330
1331
1332
1333
1334
1335
1336
1337
1338
1339
1340
1341
1342
1343
1344
1345
1346
1347
1348
1349
1350
1351
1352
1353
1354
1355
1356
1357
1358
1359
1360
1361
1362
1363
1364
1365
1366
1367
1368
1369
1370
1371
1372
1373
1374
1375
1376
1377
1378
1379
1380
1381
1382
1383
1384
1385
1386
1387
1388
1389
1390
1391
1392
1393
1394
1395
1396
1397
1398
1399
1400
1401
1402
1403
1404
1405
1406
1407
1408
1409
1410
1411
1412
1413
1414
1415
1416
1417
1418
1419
1420
1421
1422
1423
1424
1425
1426
1427
1428
1429
1430
1431
1432
1433
1434
1435
1436
1437
1438
1439
1440
1441
1442
1443
1444
1445
1446
1447
1448
1449
1450
1451
1452
1453
1454
1455
1456
1457
1458
1459
1460
1461
1462
1463
1464
1465
1466
1467
1468
1469
1470
1471
1472
1473
1474
1475
1476
1477
1478
1479
1480
1481
1482
1483
1484
1485
1486
1487
1488
1489
1490
1491
1492
1493
1494
1495
1496
1497
1498
1499
1500
1501
1502
1503
1504
1505
1506
1507
1508
1509
1510
1511
1512
1513
1514
1515
1516
1517
1518
1519
1520
1521
1522
1523
1524
1525
1526
1527
1528
1529
1530
1531
1532
1533
1534
1535
1536
1537
1538
1539
1540
1541
1542
1543
1544
1545
1546
1547
1548
1549
1550
1551
1552
1553
1554
1555
1556
1557
1558
1559
1560
1561
1562
1563
1564
1565
1566
1567
1568
1569
1570
1571
1572
1573
1574
1575
1576
1577
1578
1579
1580
1581
1582
1583
1584
1585
1586
1587
1588
1589
1590
1591
1592
1593
1594
1595
1596
1597
1598
1599
1600
1601
1602
1603
1604
1605
1606
1607
1608
1609
1610
1611
1612
1613
1614
1615
1616
1617
1618
1619
1620
1621
1622
1623
1624
1625
1626
1627
1628
1629
1630
1631
1632
1633
1634
1635
1636
1637
1638
1639
1640
1641
1642
1643
1644
1645
1646
1647
1648
1649
1650
1651
1652
1653
1654
1655
1656
1657
1658
1659
1660
1661
1662
1663
1664
1665
1666
1667
1668
1669
1670
1671
1672
1673
1674
1675
1676
1677
1678
1679
1680
1681
1682
1683
1684
1685
1686
1687
1688
1689
1690
1691
1692
1693
1694
1695
1696
1697
1698
1699
1700
1701
1702
1703
1704
1705
1706
1707
1708
1709
1710
1711
1712
1713
1714
1715
1716
1717
1718
1719
1720
1721
1722
1723
1724
1725
1726
1727
1728
1729
1730
1731
1732
1733
1734
1735
1736
1737
1738
1739
1740
1741
1742
1743
1744
1745
1746
1747
1748
1749
1750
1751
1752
1753
1754
1755
1756
1757
1758
1759
1760
1761
1762
1763
1764
1765
1766
1767
1768
1769
1770
1771
1772
1773
1774
1775
1776
1777
1778
1779
1780
1781
1782
1783
1784
1785
1786
1787
1788
1789
1790
1791
1792
1793
1794
1795
1796
1797
1798
1799
1800
1801
1802
1803
1804
1805
1806
1807
1808
1809
1810
1811
1812
1813
1814
1815
1816
1817
1818
1819
1820
1821
1822
1823
1824
1825
1826
1827
1828
1829
1830
1831
1832
1833
1834
1835
1836
1837
1838
1839
1840
1841
1842
1843
1844
1845
1846
1847
1848
1849
1850
1851
1852
1853
1854
1855
1856
1857
1858
1859
1860
1861
1862
1863
1864
1865
1866
1867
1868
1869
1870
1871
1872
1873
1874
1875
1876
1877
1878
1879
1880
1881
1882
1883
1884
1885
1886
1887
1888
1889
1890
1891
1892
1893
1894
1895
1896
1897
1898
1899
1900
1901
1902
1903
1904
1905
1906
1907
1908
1909
1910
1911
1912
1913
1914
1915
1916
1917
1918
1919
1920
1921
1922
1923
1924
1925
1926
1927
1928
1929
1930
1931
1932
1933
1934
1935
1936
1937
1938
1939
1940
1941
1942
1943
1944
1945
1946
1947
1948
1949
1950
1951
1952
1953
1954
1955
1956
1957
1958
1959
1960
1961
1962
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2041
2042
2043
2044
2045
2046
2047
2048
2049
2050
2051
2052
2053
2054
2055
2056
2057
2058
2059
2060
2061
2062
2063
2064
2065
2066
2067
2068
2069
2070
2071
2072
2073
2074
2075
2076
2077
2078
2079
2080
2081
2082
2083
2084
2085
2086
2087
2088
2089
2090
2091
2092
2093
2094
2095
2096
2097
2098
2099
2100
2101
2102
2103
2104
2105
2106
2107
2108
2109
2110
2111
2112
2113
2114
2115
2116
2117
2118
2119
2120
2121
2122
2123
2124
2125
2126
2127
2128
2129
2130
2131
2132
2133
2134
2135
2136
2137
2138
2139
2140
2141
2142
2143
2144
2145
2146
2147
2148
2149
2150
2151
2152
2153
2154
2155
2156